REMARKS

The Applicants respectfully request further examination and reconsideration in view of the amendments above and the arguments set forth fully below. Claims 1-37 were previously pending in this application. Claims 1-37 are restricted to either invention I, which includes Claims 1-14 and 31-37, or to invention II, which includes Claims 15-30. The Applicants elect to prosecute invention I, Claims 1-14 and 31-37. Claims 1-8, 10-14 and 31-37 stand rejected and Claim 9 is objected to. Claims 1, 10, 12, 13, 14, 31, and 36 are amended. Claims 1-14 and 31-37 are still pending in this application.

Objections to Drawing:

Figure 13 is objected to for mistakenly being labeled as "Figure 16". Figure 13 is amended to designate the correct label. A marked version and a clean version of Figure 13 showing the proposed changes is attached hereto.

Rejections under 35 U.S.C. §112, second paragraph

Claims 10 and 11 are rejected under U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Specifically, Claim 10 is rejected as ambiguous regarding "a" second order, and Claim 11 is rejected as containing the same ambiguity by virtue of its dependency on Claim 10. Claim 10 is amended to "wherein the at least two diffraction orders comprises a zeroth order diffraction and one of a plus or minus second order diffraction."

Rejections under 35 U.S.C. §102(e)

Claims 1, 2, 4-7, 14, and 37 are rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Application Publication No. US 2002/0105725 A1 to Sweatt et al. (hereafter Sweatt). The Applicants respectfully traverse this rejection.

Sweatt teaches an optical apparatus to select particular wavelengths of the incident light for analysis and detection. In one embodiment of Sweat, an electrically-programmable diffraction grating 16 (Sweatt, Figure 5) and a fixed diffraction grating 20 (Sweatt, Figure 5) are combined as a composite diffraction grating 50 (Sweatt, Figures 8 and 9) which performs the combined functions of the two gratings 16 and 20 (Sweatt, page 7, paragraph 0070). The

composite grating 50 comprises a plurality of electrostatically moveable elongated grating elements 52, where a fixed diffraction grating 58 comprising a plurality of fixed parallel lines or grooves 60 is formed on a top surface of each grating element 52 (Sweatt, page 7, paragraph 0071). In the absence of any applied voltage, the plurality of grating elements 52 are coplanar so that incident light is diffracted off the grooves 60 as in the fixed diffraction grating 20 (Sweatt, page 7, paragraph 0072). When voltage is applied, alternating grating elements 52 are pulled down such that the composite diffraction grating 50 behaves as the superposition of the fixed diffraction grating 58 of periodicity, d1, between adjacent grooves 60 and another diffraction grating of periodicity, d2, as determined by adjacent pairs of grating elements 52 (Sweatt, page 7, paragraph 0073). In other words, the composite diffraction grating 50 combines the diffractive effect of the two grating periods as determined by the periodicity d1 and d2. The diffraction resulting from each grating period is necessarily additive and as such results in some degree of diffraction into each of the various diffraction orders. This reduces contrast. Sweatt does not teach an activated state in which light is diffracted into a single diffractive order which is different than the diffractive orders into which light is diffracted while in a non-activated state.

In contrast, the present invention diffracts light according to either a first grating period corresponding to a non-activated state or a second grating period corresponding to an activated state for the specific purpose of isolating the diffracted light in the non-activated state verses the activated state. As a result, while in the activated state, light is diffracted into a single order which is different than the diffracted order into which light is diffracted while in the non-activated state. This provides significant benefits in the form of higher contrast.

The amended independent Claim 1 is directed to a light modulator. The light modulator comprises elongated elements arranged parallel to each other and configured in a grating plane, each elongated element comprising a reflective surface such that in operation an incident light diffracts into at least two diffraction orders, and means for adjusting a height of selected ones of the elongated elements relative to the grating plane such that <u>in operation the incident light diffracts into a single non-zero diffraction order different than the at least two diffraction orders</u>. As discussed above, Sweatt does not teach an activated state in which light is diffracted into a single diffractive order which is different than the diffractive orders into which light is diffracted while in a non-activated state. For at least these reasons, the independent Claim 1 is allowable over Sweatt.

Claims 2 and 4-7 are dependent upon the independent Claim 1. As discussed above, Claim 1 is allowable over the teachings of Sweatt. Accordingly, Claims 2 and 4-7 are allowable as being dependent upon an allowable base claim.

The amended independent Claim 14 is directed to a light modulator comprising means for diffracting an incident light into at least two diffraction orders, and means for adjusting the means for diffracting such that the incident light diffracts into a single non-zero diffraction order different than the at least two diffraction orders. For at least the same reasons as discussed above for Claim 1, the independent Claim 14 is allowable over Sweatt.

Claims 1, 2, 4, 12, and 14 are rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,181,458 to Brazas Jr., et al. (hereafter Brazas). The Applicants respectfully traverse this rejection.

Brazas teaches a mechanical grating device including a plurality of parallel ribbon elements. On the top surface of the ribbon elements is an optical coating, which is a stack of at least two different materials with different refractive indices. The thickness and the composition of the sequential layers of the stack are chosen to produce certain desired reflective properties (Brazas, Abstract). Figure 10 of Brazas illustrates the ribbon elements in a non-actuated mode in which an incident light is diffracted into at least two non-zero orders, primarily plus one and minus one first order diffraction (Brazas, col. 10, lines 23-27). Figure 11 of Brazas illustrates the ribbon elements in an actuated mode in which the incident light is reflected into a single diffraction order, the zero order (Brazas, col. 10, lines 35-36). Brazas does not teach diffracting light into a *single non-zero diffraction order*.

The amended independent Claim 1 is directed to a light modulator. The light modulator comprises elongated elements arranged parallel to each other and configured in a grating plane, each elongated element comprising a reflective surface such that in operation an incident light diffracts into at least two diffraction orders, and means for adjusting a height of selected ones of the elongated elements relative to the grating plane such that in operation the incident light diffracts into a single non-zero diffraction order different than the at least two diffraction orders. As discussed above, Brazas does not teach diffracting light into a single non-zero diffraction order. For at least these reasons, the independent Claim 1 is allowable over Brazas.

Claims 2 and 4 are dependent upon the independent Claim 1. As discussed above, Claim 1 is allowable over the teachings of Brazas. Accordingly, Claims 2 and 4 are allowable as being dependent upon an allowable base claim.

The amended independent Claim 12 is directed to a light modulator. The light modulator comprises elongated elements arranged parallel to each other and configured in a grating plane, each of selected ones of the elongated elements comprising a first conductive element, each elongated element comprising a reflective surface such that in operation an incident light diffracts into at least two diffraction orders, and a substrate coupled to the elongated elements and comprising a second conductive element such that in operation an electrical bias applied between the first conductive elements and the second conductive element adjusts a height of the selected ones of the elongated elements relative to the grating plane and further such that in operation the incident light diffracts into a single non-zero diffraction order different than the at least two diffraction orders. For at least the same reasons as discussed above for Claim 1, the independent Claim 12 is allowable over Brazas.

The amended independent Claim 14 is directed to a light modulator comprising means for diffracting an incident light into at least two diffraction orders, and means for adjusting the means for diffracting such that the incident light diffracts into a single non-zero diffraction order different than the at least two diffraction orders. For at least the same reasons as discussed above for Claim 1, the independent Claim 14 is allowable over Brazas.

Claims 31-37 are rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,172,796 to Kowarz et al. (hereafter Kowarz). The Applicants respectfully traverse this rejection.

Kowarz teaches an electro-mechanical grating device with a plurality of spaced apart deformable ribbon elements disposed parallel to each other in a non-actuated state and spanning a channel. The ribbon elements are formed on top of a base 50. The base 50 comprises several layers of different materials including a substrate 52, a bottom conductive layer 56, a protective layer 58, a standoff layer 60, a spacer layer 65, a ribbon layer 70, a reflective layer 78, an isolation layer 80 and an electrical interconnect 82 (Kowarz, Figure 4 and col. 6, line 49 to col. 7, line 35). The spacer layer 65 has a longitudinal channel 67 formed along a longitudinal direction of the device. A plurality of standoffs 61 are positioned on the bottom of the channel 67. The standoffs 61 are patterned from the standoff layer 60 (Kowarz, col. 7, lines 52-55). Clearly, the standoffs are permanent features of each device. As can be seen in Figures 7-9 and 10-12 of Kowarz, the standoffs 61 are necessary to properly position the deflected ribbon elements while in an activated state. As can also be seen in Figures 7-9 and 10-12 of Kowarz, the size of each ribbon element grouping is related to the number of standoffs 61. In Figures 7-9 of Kowarz, the

ribbon elements are grouped into threes which necessitates one standoff 61 per group. In Figures 10-12 of Kowarz, the ribbon elements are grouped into fours which necessitates two different sets of standoffs 61 (Kowarz, col. 8, lines 63-65). Since the standoffs 61 are a fixed feature of each device, the grouping of the ribbon elements is also fixed, depending on the desired configuration. For example, the ribbon elements of the device in Figures 7-9 of Kowarz are grouped into three. This is not variable. As such, *the group configuration for a given device is not dynamically configurable.* In order for the groups to be reconfigured, a new device with appropriate standoffs needs to be manufactured. Also, since the group configuration remains fixed for a given device, the device of Kowarz diffracts light into a fixed first order diffraction angle including either a plus first order diffracted output beam 92b or a minus first order diffracted output beam 92c. In either case, the single order diffraction angle is constant.

Kowarz teaches that each ribbon element is electrically connected to allow separate application of actuation voltages. However, it is clear that when the actuation voltage is applied the actuation voltage is the same for all ribbon elements. That is, each time an actuation voltage is applied, the voltage level is the same. This follows from the fact that the standoffs 61 are used to stop the actuated ribbon elements at a desired location. The deflection distance of each actuated ribbon element is not dependent on the amount of the actuation voltage, but instead on the height of the standoff 61. It is merely sufficient that the actuation voltage be enough to deflect the ribbon elements to the lowest actuation position and it is left to the standoffs 61 to accurately stop the ribbon elements. Kowarz does not teach applying a varying actuation voltage to each of the ribbon elements, as does the present invention.

The amended independent Claim 31 is directed to a light modulator comprising elongated elements arranged parallel to each other and dynamically configurable in groupings of the elongated elements, each elongated element comprising a reflective surface such that in operation an incident light illuminating the elongated elements produces a reflected light when the elongated elements are at a first height, each of the groupings comprising at least three of the elongated elements and each of the groupings comprising an identical number of the elongated elements, and means for adjusting a relative height of the elongated elements of each of the groupings such that in operation the incident light illuminating the elongated elements produces a single diffraction order. As discussed above, Kowarz does not teach dynamically configurable groupings of elements. For at least these reasons, the independent Claim 31 is allowable over Kowarz.

The amended independent Claim 36 is directed to a light modulator comprising elongated elements arranged parallel to each other and configured in groupings of the elongated elements, each elongated element comprising a reflective surface and a first conductive element, each of the groupings comprising at least three of the elongated elements and each of the groupings comprising an identical number of the elongated elements, and a substrate coupled to the elongated elements, the substrate comprising a second conductive element such that in operation an incident light illuminating the elongated elements produces a reflected light when the elongated elements are at a first height and further such that in operation a relative height of the elongated elements of each grouping are adjusted to produce a single diffraction order when individually varying electrical biases are applied between the first conductive elements of each of the groupings and the second conductive element. As discussed above, Kowarz does not teach applying a varying actuation voltage to each of the ribbon elements. For at least these reasons, the independent Claim 36 is allowable over Kowarz.

The independent Claim 37 is directed to a light modulator comprising means for reflecting an incident light, and means for adjusting the means for reflecting such that the incident light diffracts into a single diffraction order having a variable diffraction angle. As discussed above, Kowarz does not teach diffracting light into a single diffraction order having a variable diffraction angle.

Rejections under 35 U.S.C. §103(a)

Claim 3 is rejected under 35 U.S.C. §103(a) as being unpatentable over Brazas in view of U.S. Patent No. 5,661,592 to Bornstein et al. (hereafter Bornstein). Claim 3 is dependent upon the independent Claim 1. As discussed above, Claim 1 is allowable over the teachings of Brazas. Accordingly, Claim 1 is allowable as being dependent upon an allowable base claim.

Claim 8 is rejected under 35 U.S.C. §103(a) as being unpatentable over Sweatt in view of U.S. Patent No. 6,071,652 to Feldman et al. (hereafter Feldman). Claim 8 is dependent upon the independent Claim 1. As discussed above, Claim 1 is allowable over the teachings of Brazas. Accordingly, Claim 1 is allowable as being dependent upon an allowable base claim.

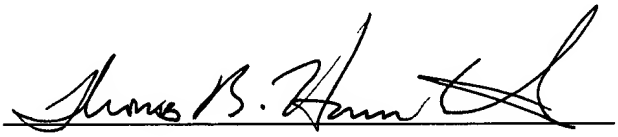
Claim 13 is rejected under 35 U.S.C. §103(a) as being unpatentable over Sweatt in view of Brazas. The Applicants respectfully traverse this rejection. The amended independent Claim 13 is directed to a light modulator comprising elongated elements arranged parallel to each other in a grating plane, each elongated element comprising a blaze profile, each blaze profile

comprising a reflective surface, each of selected ones of the elongated elements comprising a first conductive element along the blaze profile, the blaze profile comprising at least two planar surfaces, the two planar surfaces comprising planes parallel to the grating plane such that in operation an incident light diffracts into at least two diffraction orders, and a substrate coupled to the elongated elements, the substrate comprising a second conductive element such that, when an electrical bias is applied between the first conductive elements and the second conductive element, adjusts a height of the selected ones of the elongated elements and the incident light diffracts into a non-zero single diffraction order different than the at least two diffraction order. For at least the same reasons as discussed above in relation to Claims 1, 12, and 14, the independent Claim 13 is allowable over Sweatt in view of Brazas.

For the reasons given above, the Applicants respectfully submits that Claims 1-14 and 31-37 are now in a condition for allowance, and allowance at an early date would be appreciated. Should the Examiner have any questions or comments, he/she is encouraged to call the undersigned attorney at (408) 530-9700.

Respectfully submitted,
HAVERSTOCK & OWENS LLP

Date: December 19, 2002

By: 

Thomas B. Haverstock
Reg. No. 32,571

Attorney for Applicant